

### **Bonding/Structure Questions**

1. Use the principles of atomic structure and/or chemical bonding to explain each of the following. In each part, your answer must include references to both substances.
  - (a) The atomic radius of Li is larger than that of Be.
  - (b) The second ionization energy of K is greater than the second ionization energy of Ca .
  - (c) The carbon-to-carbon bond energy in  $\text{C}_2\text{H}_4$  is greater than it is in  $\text{C}_2\text{H}_6$ .
  - (d) The boiling point of  $\text{Cl}_2$  is lower than the boiling point of  $\text{Br}_2$ .

2. Using principles of chemical bonding and molecular geometry, explain each of the following observations. Lewis electron-dot diagrams and sketches of molecules may be helpful as part of your explanations. For each observation, your answer must include references to both substances.

(a) The bonds in nitrite ion,  $\text{NO}_2^-$ , are shorter than the bonds in nitrate ion,  $\text{NO}_3^-$ .

(b) The  $\text{CH}_2\text{F}_2$  molecule is polar, where as the  $\text{CF}_4$  molecule is not.

(c) The atoms in a  $\text{C}_2\text{H}_4$  molecule are located in a single plane, whereas those in a  $\text{C}_2\text{H}_6$  molecule are not.

(d) The shape of a  $\text{PF}_5$  molecule differs from that of an  $\text{IF}_5$  molecule.

(e)  $\text{HClO}_3$  is a stronger acid than  $\text{HClO}$ .